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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
BARAN, MARY C	

ART UNIT	PAPER NUMBER
2857	

DATE MAILED: 11/29/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

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Offic Action Summary	Application No. 09/742,224	Applicant(s) FANG ET AL.	
	Examiner Mary Kate B Baran	Art Unit 2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 August 2002 .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. This action is responsive to the Amendment filed on 29 August 2002. Claims 1-20 are pending. Claims 1, 2, 9-12, 16 and 18-20 have been amended.

2. The amendments filed on 29 August 2002 are sufficient to overcome the prior 35 U.S.C. 112 second paragraph rejections of claims 1-20, the specification objections, the abstract objections and the objections to claims 2, 9 and 10.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boyington et al. (U.S. Patent No. 6,377,897) in view of Chien et al.

With regard to claims 1 and 12, Boyington et al. discloses providing a plurality of integrated circuits (col. 3, lines 31-33); performing a life-time testing process, wherein a failure rate testing time relation is established by measuring the life-time of each integrated circuit under a testing environment, wherein an acceleration factor is related to the relationship between a testing time of the testing environment and a real time of a normal operating environment [i.e., a core time is calculated from historical data (i.e.,

acceleration factor) which is the time of stress that is to be applied to all ICs in a batch] (col. 3, lines 16-29); performing a transforming process using the acceleration factor function to transform the testing time function into a real time function, wherein a knee point of the real time function corresponds to an operation time which is a best burn-in time [i.e., when the failure slope (i.e., knee point) slows to a certain level, the determination is made that the infant mortalities have been identified and the remaining ICs need no additional burn-in (i.e., best burn-in time)] (col. 3, line 61 to col. 4, line 4, and col. 4, lines 8-23); and performing an integrating process by integrating a real time function through a calculating region to "consult" an accumulated failure rate real time function, wherein the calculating region is a region in which the real time is larger than the best burn-in time [i.e., a performance database is maintained that contains failure rates accumulated over a core period at read-points including a passing read-point (i.e., in order to determine a passing read-point, it is necessarily the case that the calculating region must extend beyond the best burn-in time)] (col. 3, lines 40-47). Boyington et al. does not disclose simulating a failure rate testing time relation, or simulating a failure rate real time relation.

Chien et al. discloses simulating a failure rate real time relation (page 463, "III. Methods" and "B. Simulation").

It would have been obvious to one of ordinary skill to modify Boyington et al. to simulate a failure rate real time relation that was transformed from a failure rate testing time function, and simulate a failure rate testing time relation, because Chien et al. teaches that by doing so, the total costs and the mean residual lives under different

burn-in times can be calculated (page 463, "III. Methods"), and using either a testing time or real time relation are functionally equivalent in determining the results of the simulation.

With regard to claims 2 and 13, Boyington et al. discloses a failure rate testing time relation divided into three periods, infant mortality, normal, and wear out (Fig. 3 and col. 4, lines 5-8).

With regard to claims 3-8, 14 and 15, as noted previously, Boyington et al. discloses certain features of the claimed invention, including an acceleration factor function (i.e., core time, as noted previously; col. 3, lines 19-30) but does not explicitly disclose an acceleration factor function that is constant, linear, or nonlinear; or a testing time function that is an exponent function, a polynomial, or "$y=at^b$".

Chien discloses an acceleration factor function that is constant, linear, and nonlinear; and a testing time function that is an exponent function, a polynomial, and in the form "$y=at^b$" (i.e., Equation (1) and Equation (3), which depending on the values of variables λ and β (i.e., "a") and "D" (i.e., "b"), will represent an acceleration factor that is constant, linear, and nonlinear, and a testing time function that is exponential, polynomial, and "$y=at^b$" (pages 462-463, "A. U-Shaped Failure Rate Function" and "A. Generating a U-Shaped Failure Rate Curve"), because failure rate is related to testing time and the acceleration factor function.

It would have been obvious to one of ordinary skill to modify Boyington et al. to include an acceleration factor function that is constant, linear, and nonlinear; and a testing time function that is an exponent function, a polynomial, and "$y=at^b$", as taught by Chien, because Chien suggests that doing so allows the failure rate to be calculated in various regions of the failure rate curve including the constant failure rate region and the wear-out section (page 463, "A. Generating a U-Shaped Failure Rate Curve").

With regard to claims 9, 10, 16 and 17, as noted previously, Boyington et al. discloses minimizing an error (i.e., such as a last square error) between the failure rate testing time relation and the testing time function [i.e., dynamically fine tuning burn-in testing based on past performance data, such that the delta between instantaneous failure rates and actual read points is compared to established criteria in a performance database to dynamically control the duration of burn-in (i.e., the error between failure rates and the testing time function is minimized) (col. 4, lines 24-29 and 39-46).

With regard to claims 11 and 18, as noted previously, Boyington et all discloses certain features of the claimed invention, but does not disclose stopping the integrating process when the testing time is located in the wear out period.

Chien et al. discloses stopping the integrating process when the testing time is located in the wear out period.[i.e., "t_{L2}" is calculated (i.e., via an integration/summing process; (page 463, A. Generating a U-Shaped Failure Rate Curve) to determine when the product starts to wear out (page 463, "III. Methods")].

It would have been obvious to one of ordinary skill to modify Boyington et al. to stop the integrating process when the testing time is located in the wear out period as taught by Chien et al., because Chien et al. teaches that doing so allows a warranty plan to be set and a life-cycle model to be constructed (page 463, "III. Methods").

4. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boyington et al. (U.S. Patent No. 6,377,897) in view of Chien et al. and further in view of Matsuoka (U.S. Patent No. 5,204,618).

With regard to claim 19, Boyington et al. discloses providing a plurality of integrated circuits (col. 3, lines 31-33); performing a life-time testing process, wherein the life-time of each integrated circuit is measured under a testing environment and a failure rate testing time relation is established in accordance with a plurality of testing records, wherein an acceleration factor is related to the relationship between a testing time of the testing environment and a real time of a normal operating environment, and performing an optimization process where part of the testing records are deleted and the process is performed again while more than one integrated circuit is failed [i.e., a core time is calculated from historical data (i.e., acceleration factor) which is the time of stress that is to be applied to all ICs in a batch (col. 3, lines 16-29); and the failure rate calculation which uses a failure rate testing time relation also considers statistical analysis of past performance data extracted from a performance database that enables burn-in testing to be dynamically fine-tuned (col. 4, lines 24-29); it is noted that Boyington et al. does not explicitly delete records, but rather a subset of prior records

are used to optimize the determination of best burn-in time, which is functionally equivalent to the deletion of a portion of prior testing records/historical data]; performing a transforming process using the acceleration factor function to transform a specific testing time into a specific real time and transform a testing time polynomial into a real time polynomial, wherein the specific real time (i.e., a knee point of the real time function) corresponds to an operation time which is a best burn-in time for testing the integrated circuits [i.e., when the failure slope (i.e., knee point) slows to a certain level, the determination is made that the infant mortalities have been identified and the remaining ICs need no additional burn-in (i.e., best burn-in time)] (col. 3, line 61 to col. 4, line 4, and col. 4, lines 8-23); and performing an integrating process by integrating a real time function through a calculating region to "consult" an accumulated failure rate real time function, wherein the calculating region is a region in which the real time is larger than the best burn-in time [i.e., a performance database is maintained that contains failure rates accumulated over a core period at read-points including a passing read-point (i.e., in order to determine a passing read-point, it is necessarily the case that the calculating region must extend beyond the best burn-in time)] (col. 3, lines 40-47). Boyington et al. does not disclose simulating a failure rate testing time relation using a polynomial of the testing time; or determining a best testing time (i.e., bust burn-in time) of the integrated circuits while only one of the integrated circuits has failed before a specific testing time.

Chien et al. discloses simulating a failure rate real time relation (page 463, "III. Methods" and "B. Simulation"). Matsuoka discloses a monitored burn in system that has

the capability of outputting an electrical signal when one of the integrated circuits fails, and calculating a cumulative failure rate, counting the cumulative number of failed integrated circuits at predetermined time intervals, and commanding burn-in to stop when a predetermined reference number of integrated circuits has failed (col. 3, lines 10-38).

It would have been obvious to one of ordinary skill to modify Boyington et al. to simulate a failure rate real time relation that was transformed from a failure rate testing time function, because Chien et al. teaches that by doing so, the total costs and the mean residual lives under different burn-in times can be calculated (page 463, "III. Methods"). Further, it would have been obvious to one of ordinary skill to modify Boyington et al. to determine a best testing time (i.e., bust burn-in time) of the integrated circuits while only one of the integrated circuits has failed before a specific testing time (i.e., a predetermined reference count; col. 3, lines 27-32), because Matsuoka teaches that monitoring the burn-in process enhances the reliability of burn-in procedures (col. 1, lines 21-28).

With regard to claim 20, as noted previously, Boyington et al. discloses many features of the claimed invention, but does not disclose stopping the integrating process when the testing time is located in the wear out period.

Chien et al. discloses stopping the integrating process when the testing time is located in the wear out period.[i.e., "t_{L2}" is calculated (i.e., via an integration/summing

process; (page 463, A. Generating a U-Shaped Failure Rate Curve) to determine when the product starts to wear out (page 463, "III. Methods")].

It would have been obvious to one of ordinary skill to modify Boyington et al. to stop the integrating process when the testing time is located in the wear out period as taught by Chien et all, because Chien et al. teaches that doing so allows a warranty plan to be set and a life-cycle model to be constructed (page 463, "III. Methods").

Response to Arguments

5. Applicant's arguments filed on 20 August 2002 have been fully considered but they are not persuasive.

The Applicant's arguments reflect the scope and intended use of the instant application, and do not pertain to the language of the claims. The arguments explain performing the stress test only once, calculating results such as reliability, and relating the invention to cost and mean residual live, however these are not limitations found in the claims.

The Applicant further argues that Boyington et al. does not teach an acceleration factor function or a transformation between time scales. The limitation from claim 1, states that, "an acceleration factor is related to the relationship between a testing time of the testing environment and a real time of a normal operating environment". Boyington et al. teaches a core time (i.e. real time of a normal operating environment) calculated from historical data (i.e. testing time of the testing environment) and using this data calculations are made to determine whether or not burn-in should continue (i.e.

acceleration factor) (see Boyington et al., column 3 lines 16-30). A further limitation of claim 1, teaches "a transformation using the acceleration factor function to transform the testing time function into a real time function". Boyington et al. teaches using the historical data (i.e. testing time) to generate a core time (i.e. real time) (see Boyington et al., column 3 lines 16-30).

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Kate B Baran whose telephone number is (703) 305-4474. The examiner can normally be reached on Monday - Friday from 8:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S Hoff can be reached on (703) 308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

MKB
November 18, 2002

Marc Hoff

MARC S. HOFF
SUPERVISORY PATENT EXAMINER
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